

AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

Listing of Claims:

Claim 1 (Currently Amended): An ultrasonic flowmeter to measure a flow rate of a fluid ~~to be measured~~, comprising:

an ultrasonic transmitter for launching ultrasonic pulses of a predetermined frequency into the fluid ~~to be measured~~ in a fluid pipe from an ultrasonic transducer along a measuring line;

a flow velocity distribution measuring ~~means-unit~~ for measuring flow velocity distribution of the fluid ~~to be measured~~ in a measurement region by receiving ultrasonic echoes reflected from the measurement region among the ultrasonic pulses incident into the fluid ~~to be measured~~; and

a flow rate operation ~~means-unit~~ for calculating a flow rate of the fluid ~~to be measured~~ in the measurement region based on the flow velocity distribution of said fluid ~~to be measured~~,

wherein said flow velocity distribution measuring ~~means-unit~~ comprises:

a graph output ~~means-unit~~ for outputting a flow velocity distribution graph displaying the flow velocity distribution in two axes of positions in the inner diameter direction of the fluid pipe relating to the measuring line and fluid velocities corresponding to the inner diameter direction; and

an inner wall position calculating ~~means-unit~~ for calculating the position of the inner wall with respect to the axis in the inner diameter direction by calculating its inflection point from the flow velocity distribution graph outputted by the graph output ~~means-unit~~, and

wherein said flow rate operation ~~means-unit~~ measures a flow rate of the fluid ~~to be~~

~~measured~~ by an integral operation based on the inner wall position calculated by said inner wall position calculating ~~means~~unit.

Claim 2 (Currently Amended): The ultrasonic flowmeter according to claim 1, wherein said flow velocity distribution measuring ~~means~~unit includes a fine adjustment input data receiver which enables to finely adjust the inner wall position calculated by the inner wall position calculating ~~means~~unit by ~~means of manual input~~adjustment.

Claim 3 (Currently Amended): An ultrasonic flowmeter to measure a flow rate of a fluid ~~to be measured~~, comprising:

an ultrasonic transmitter for launching ultrasonic pulses of a predetermined frequency into the fluid ~~to be measured~~ in a fluid pipe from an ultrasonic transducer along a measuring line;

a flow velocity distribution measuring ~~means~~unit for measuring flow velocity distribution of the fluid ~~to be measured~~ in a measurement region by receiving ultrasonic echoes reflected from the measurement region among the ultrasonic pulses incident into the fluid ~~to be measured~~; and

a flow rate operation ~~means~~unit for calculating a flow rate of the fluid ~~to be measured~~ in the measurement region based on the flow velocity distribution of said fluid ~~to be measured~~,

wherein said flow velocity distribution measuring ~~means~~unit comprises:

a graph output ~~means~~unit for outputting a flow velocity distribution graph displaying the flow velocity distribution in two axes of positions in the inner diameter direction of the fluid pipe relating to the measuring line and the fluid velocity corresponding to the inner

diameter direction;

a manual input data receiver for receiving manual ~~input~~ adjustment data regarding an inner wall position with respect to the axis in the inner diameter direction; and

an inner wall position calculating ~~means~~ unit for calculating the inner wall position with respect to the axis in the inner diameter direction based on the manual ~~input~~ adjustment data received by the manual input data receiver,

wherein said flow rate operation ~~means~~ unit measures a flow rate of the fluid ~~to be measured~~ by an integral operation based on the inner wall position calculated by said inner wall position calculating ~~means~~ unit.

Claim 4 (Currently Amended): A method ~~of~~ for measuring a flow rate of a fluid measurement using an ultrasonic flowmeter ~~measuring a flow rate of a fluid to be measured,~~ comprising: the flowmeter including

an ultrasonic transmitter for launching ultrasonic pulses of a predetermined frequency into the fluid ~~to be measured~~ in a fluid pipe from an ultrasonic transducer along a measuring line;

a flow velocity distribution measuring ~~means~~ unit for measuring flow velocity distribution of the fluid ~~to be measured~~ in a measurement region by receiving ultrasonic echoes reflected from the measurement region among the ultrasonic pulses incident into the fluid ~~to be measured~~; and

a flow rate operation ~~means~~ unit for calculating a flow rate of the fluid ~~to be measured~~ in the measurement region based on the flow velocity distribution of said fluid ~~to be measured~~, and

~~by said flow velocity distribution measuring means,~~ the method comprising the steps

of:

~~outputting graph~~ ~~outputting to output~~ a flow velocity distribution graph displaying the flow velocity in two axes of positions in the inner diameter direction of the fluid pipe relating to the measuring line and fluid velocities corresponding to the inner diameter direction;

~~inner wall position~~ ~~calculating to calculate~~ the position of the inner wall with respect to the axis in the inner diameter direction; and

~~flow rate operating to calculate~~ calculating the flow rate of the fluid ~~to be measured~~ by an integral operation based on the inner wall position calculated at said inner wall position calculation step ~~by said flow rate operation means~~.

Claim 5 (Currently Amended): A method for measuring a flow rate of a fluid ~~of flow rate measurement~~ using an ultrasonic flowmeter ~~to measure a flow rate of a fluid to be measured~~, comprising: the flowmeter including

an ultrasonic transmitter for launching ultrasonic pulses of a predetermined frequency into the fluid ~~to be measured~~ in fluid pipe from an ultrasonic transducer along a measuring line;

a flow velocity distribution measuring ~~means~~ unit for measuring flow velocity distribution of the fluid ~~to be measured~~ in a measurement region by receiving ultrasonic echoes reflected from the measurement region among the ultrasonic pulses incident into the fluid ~~to be measured~~; and

a flow rate operation ~~means~~ unit for calculating a flow rate of the fluid ~~to be measured~~ in the measurement region based on the flow velocity distribution of said fluid ~~to be measured~~, and

~~by said flow velocity distribution measuring means~~, the method comprising the steps

of:

~~graph outputting to output~~outputting a flow velocity distribution graph displaying the flow velocity distribution in two axes of positions in the inner diameter direction of the fluid pipe relating to the measuring line and fluid velocities corresponding to the inner diameter direction;

~~manual input data receiving~~ manual adjustment data ~~to receive manual input data~~ regarding the inner wall position with respect to the axis in the inner diameter direction;

~~inner wall position calculating to calculate~~calculating the inner wall position with respect to the axis in the inner diameter direction based on the manual ~~input~~ adjustment data received at the manual ~~input~~ adjustment data receiving step; and

~~flow rate operating to calculate~~calculating the flow rate of the fluid ~~to be measured~~ by an integral operation based on the inner wall position calculated at said inner wall position calculation step ~~by said flow rate operation means~~.

Claim 6 (Currently Amended): A storage medium having a computer program product recorded thereon, the program configured to ~~executing to~~ control an ultrasonic flowmeter to measure a flow rate of a fluid ~~to be measured, comprising: the flowmeter~~ including

an ultrasonic transmitter for launching ultrasonic pulses of a predetermined frequency into the fluid ~~to be measured~~ in a fluid pipe from an ultrasonic transducer along a measuring line;

a flow velocity distribution measuring ~~means~~ unit for measuring flow velocity distribution of the fluid ~~to be measured~~ in a measurement region by receiving ultrasonic echoes reflected from the measurement region among the ultrasonic pulses incident into the

~~fluid to be measured~~; and

a flow rate operation ~~means-unit~~ for calculating a flow rate of the fluid ~~to be measured~~ in the measurement region based on the flow velocity distribution of said fluid ~~to be measured~~,
~~measured~~,

wherein said computer program product makes the ultrasonic flowmeter execute a method including the steps of:

~~graph outputting to output~~outputting a flow velocity distribution graph displaying the flow velocity distribution in two axes of positions in the inner diameter direction of the fluid pipe relating to the measuring line and fluid velocities corresponding to the inner diameter direction ~~by the flow velocity distribution measuring means~~;

~~inner wall position calculating to calculate~~calculating the inner wall position with respect to the axis in the inner diameter direction by calculating the inflection point from the fluid velocity distribution graph outputted at the distribution graph outputting step; and

~~flow rate operating to calculate~~calculating the flow rate of the fluid ~~to be measured~~ by an integral operation based on the inner wall position calculated at the inner wall position calculation step.

Claim 7 (Currently Amended): A storage medium having a computer program product recorded thereon, the program configured to control an ultrasonic flowmeter to measure a flow rate ~~of a fluid to be measured~~, comprising: the flowmeter including

an ultrasonic transmitter for launching ultrasonic pulses of a predetermined frequency into the fluid ~~to be measured~~ in a fluid pipe from an ultrasonic transducer along a measuring line;

a flow velocity distribution measuring ~~means-unit~~ for measuring flow velocity

distribution of the fluid ~~to be measured~~ in a measurement region by receiving ultrasonic echoes reflected from the measurement region among the ultrasonic pulses incident into the fluid ~~to be measured~~; and

a flow rate operation ~~means-unit~~ for calculating a flow rate of the fluid ~~to be measured~~ in the measurement region based on the flow velocity distribution of said fluid ~~to be measured~~,
~~measured~~,

wherein said computer program product makes the ultrasonic flowmeter execute a method including the steps of:

~~graph outputting to output~~ outputting a flow velocity distribution graph displaying the flow velocity distribution in two axes of positions in the inner diameter direction of the fluid pipe relating to the measuring line and fluid velocities corresponding to the inner diameter direction ~~by the flow velocity distribution measuring means~~;

~~manual input data-receiving to receive~~ manual input adjustment data regarding the inner wall position with respect to the axis in the inner diameter direction;

~~inner wall position-calculating to calculate~~ an inner wall position with respect to the axis in the diameter direction; and

~~flow rate-operating to calculate~~ calculating the flow rate of the fluid ~~to be measured~~ by an integral operation based on the inner wall position calculated at the inner wall position calculation step.

Claim 8 (New): The method for measuring a flow rate according to Claim 4, wherein said calculating the position of the inner wall calculates said position by calculating the inflection point from the fluid velocity distribution.